Chasing the Buzz; Exploring Sense Deprivation in Bodily Play

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Figure 1 – Two participants testing game version 4

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Abstract

Physical games involving blindfolded players have a timeless appeal and the restricting of perceptual channels can be insightful for players and observers regarding embodied experience. Wireless, mobile and wearable technologies open up further opportunities for designing bodily play experiences through exploiting sensory deprivation. To better understand the potential for movement-based games in which vision and/or audio is restricted, we iteratively developed and play-tested a series of three to four player chasing games. Based on our tests, we suggest the importance of ambiguity, proximity, and freedom of movement to support designing sensory deprivation games.

Author Keywords

Sense deprivation; embodied interaction; bodily play; multimodal.

CSS Concepts

Miscellaneous;

Introduction

Bodily games are rich multi-sensory experiences. For instance, in the classic game, tag, we see the other players when we are chasing them, we hear the other players, we touch them when we 'tag' them and if it is fun, we hear their laughter. Bodily games may also rely

Participants

In addition to the research team, 8 participants were recruited. 5 of these were master students within Design and 3 master students within Psychology. The age of the participants ranged from 24 to 32. The participants in each group were acquainted.

The participants were informally recruited via the university's master programs.

Exploration
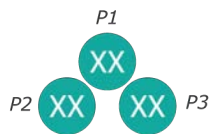
Sense Deprivation: sight

Play: 2 seeing participants making different sounds. 1 blindfolded participant had to locate the seeing participants using only touch and hearing.

Goal: Understanding the possibilities of senses in games and play

Figure 2 - First exploration and setup

on the deprivation of senses, as is the case with Marco Polo. Besides challenging those who are part of the game, sensory deprivation games have also been used to provide unconventional challenges. In traditional schoolyard games, such as soccer and dodgeball, it is not uncommon for the fastest player to dominate the game. Sensory deprivation is one way to even out the skills of the different players.

In this paper, we will take you through our iterative process of exploring how sight deprivation affects movement and how we designed a sense deprivation game based on those explorations. We emphasize the aspect of balancing player skills - meaning 'handicapping' all players through sensory deprivation to create a different play experience. The paper is based on a three-week project in which we conducted several exploration and testing phases, each with the goal of getting new insights into how sense deprivation affects players and how to improve gameplay. We end this paper with three design considerations rooted in our work and tested in our latest version of the game.

Related Works

How engaged players are in a competitive experience rely heavily on the skill level of that individual player and the skill levels of the other players. According to Altimira et al. [1], the level of engagement is influenced by whether the right amount of challenge is provided. Balancing physical games can be seen in classical games like golf, where players have a 'handicap' or by imposing levelling rules, such as leading players should throw with their non-dominant arm. Levelling player skills, whether by putting up obstacles for leading players or enhancing less dominant players, has been done through restricting or manipulating the senses.

Using sensory substitution, Winoto & Tang [15] created a wearable mobile game that substituted vision for hearing to engage visually impaired players. Olickel et al. [11] on the other hand, created a game for all players, which substituted sight for haptic feedback through a wearable device.

A different path is sense deprivation, and a common sense to deprive players of is sight. Finnegan et al. [3] created the competitive, multiplayer, team-based game 'Reindeer & Wolves', where blindfolded wolves must catch seeing reindeer. The deprivation of sight can also be used as a factor in one-on-one competitive games, as was the case with 'Boy and Wolf' by Tiab et al. [13], where a blindfolded boy must catch a seeing 'wolf' (another player) with a loudspeaker on their head. Sensory deprivation has also been used in collaborative games like Audio Arc [8]. In Audio Arc players must, in pairs, find each other based on a unique sound emitted from their phones, while blindfolded. Lade and Duckworth [8] found that players experienced surprise, especially mentioning their "heightened experience of acoustic awareness and the challenge of spatial orientation whilst blindfolded".

Common for the aforementioned three games, is that they are played with at least one blindfolded player. This begs the question of what is gained from playing sense deprivation games? According to Vongsathorn et al. [14] removing "the visual sense (e.g. through shutting your eyes) is a well-established practice in somatics for heightening senses and focusing on an internal awareness of body movement that can encourage contemplation and reflection". Lade and Duckworth [8] also found that disabling players' visual senses resulted in responses that were more embodied,
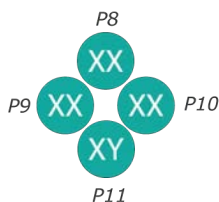
Early Gameplay Testing
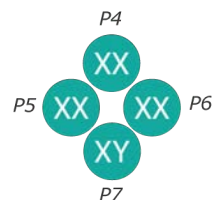
Sense Deprivation: sight and hearing

Play: 4 participants in two teams - all blindfolded, and two also deafened. In teams the hearing had to find the blindfolded and deafened teammate using touch and hearing.

Goal: Perceptions of being sense deprived in games and play

Figure 3 - Early Gameplay and setup

Gameplay Testing 1.0

Sense Deprivation: sight

Play: All participants blindfolded. 1 game artefact. Participants had to locate game artifact and then keep aways from other participants

Goal: Create design suggestions based on tendencies within sense depriviation games and play

Figure 4 - Gameplay Testing 1.0 and setup

rather than inhibited, which might not be what we would normally expect when a sense is deprived of us. Sense deprivation allows for levelling of player abilities, by putting players in a new situation, which their body and senses are not used to, forcing them to think, act and move in new ways [13].

Relating to bodily interactions in games, we see people pushing, pulling, and strategically moving [9]. This can be conditioned by the type of bodily interplay intended in the game.

Approach

This project follows the concept of research through design [16]. By actively reframing and iterating on the notion of sense deprivation games, we focused on designing the right thing based on knowledge and insights gained along the way. Our methodology included semi-structured group interviews [12], several tests with different participants and test analysis. For each semi-structured interview, an interview guide was created, and the session was video recorded. The testing was conducted in an approximately 60 m2 room with tables and chairs moved to the walls to ensure as much space as possible and to lower the risk of blindfolded participants bumping into furniture and hurting themselves.

The tests were conducted using a Wizard of Oz method [2]. For version 3 and 4 (Gameplay Testing 1.0 and 2.0) (Figure 4 & 7), a ball that emits sound when it is held by a player was created. Through using LittleBits (electronic, magnetic building blocks) to create circuits, which have the option of operating wirelessly, it was possible for the observer and scorekeeper to manually press a button, which would enable and disable the sound as needed.

All testing sessions were video recorded, and all videos were analyzed, first with a focus on general patterns of movement and reactions between the different participants. Then the videos were analyzed with specific emphasis on the soundtrack and exclamations made throughout the games by participants, to get a different perspective on the footage and the experiences of the participants. This analysis and the results from the interviews were compared to gain a deeper insight into what worked and what did not.

Process

Our project had four phases, which we call 1) Exploration, 2) Early Gameplay Testing, 3) Gameplay Testing 1.0 and 4) Gameplay Testing 2.0.

To comprehend the importance of senses in gameplay, the research team (P1, P2, P3) - explored the possibilities and difficulties of being deprived of sight (Figure 2). The research team switched roles between being blindfolded or seeing in tasks involving locating the other participants solely based on different sounds. For each test round, the sounds varied, e.g. clapping or vocalizing. The aim was to understand whether the blindfolded participant would change tactics of locating the other participants.

As the initial explorations focused mainly on sight deprivation and working alone, the second step was to deprive more than one sense and to work in teams (Figure 3). In the Early Gameplay Testing, the participants tried abbreviated versions of the same exercises as was done in Exploration. Afterwards, the participants worked in teams of two (P4 & P5 + P6 & P7), P4 and P6 were blindfolded, while P5 and P7 were both deprived of their sight and hearing. So, participants were now deprived of two perceptual

Figure 5 - Participants chasing each other in a 'zombielike' pose

Figure 6 - Movement strategy

channels but similar to the first test, there we no rules concerning how players should locate each other. This was done with the aim of gaining insights into how the senses and the deprivation of senses influence participants in play.

The key findings from Exploration and Early Gameplay Testing showed patterns and tendencies. Firstly, the longer a participant was 'blind', the more they started to rely on their other senses and became more daring. Secondly, it quickly became clear that proximity is a factor. Participants seemed to know when they were close to someone, prompting more hand movements as well as laughter when close to or bumping into others. Thirdly, locating strategies seemed to emerge, as the participants who were locating the others positioned themselves in 'zombielike' poses with arms outstretched in front of them (see Figure 5). Though participants afterwards said they enjoyed parts of the tests and laughed, the video analysis showed that participants seemed nervous, uncomfortable and less inclined to engage, when deprived of two senses rather than just one. Therefore, subsequent versions only deprived participants of one sense, sight.

We base our subsequent gameplays on the two initial versions and tendencies discovered so far. The initial explorations give us a point of comparison concerning the number of participants along with familiarity amongst the participants and how this might affect the results.

Gameplay Testing 1.0
Participants P8, P9, P10 & P11 tested a gameplay in which all participants were blindfolded and had to get hold of a ball making sounds (Figure 6). Once a participant got the ball, they had to keep it for the

longest time possible before other players 'stole' the ball.

Similar to the Early Gameplay Testing, it became evident that players tend to position themselves in a 'zombielike' pose, with both arms outstretched in front of their body in the approximate height of their shoulders. Little to no talking occurred once the game had begun, which might have contributed to players listening for the position of the ball. After playing the game for a while, one player employed a strategy of 'tricking' the other players by using the sound emitted by the ball to confuse the other players of its whereabouts. By holding the ball in one hand, extending his arm away from his body, he could quickly switch the position of the sound source and thus confuse his opponents. He succeeded in occupying the ball for a significantly longer time than his fellow players had done.

Compared to the first two versions (Exploration and Early Gameplay Testing), the players' skills became more equal, at least in the beginning, when all players were blindfolded. After playing the game for a while, player strategies began to emerge, allowing one player to keep the ball for an extended period of time. There were no patterns of a dominant player, who were keener to win, due to his/her athletic skills. But participants could gain an edge by using his/her other senses in strategic ways, for instance by listening to footsteps. Therefore, we chose to continue with all players being blindfolded in the following version.
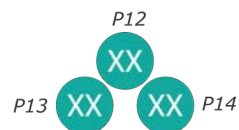
Gameplay Testing 2.0
The latest game version has participants chasing the Buzz. The game is intended for three to six players. All players are blindfolded, and the aim is to catch a ball

Gameplay Testing 2.0

Sense Deprivation: sight

Play: 3-6 participants - all blindfolded. Aim is to find and keep ball 3 times for 15 seconds without being catched by other participants.

Goal: Testing gameplay based on design suggestions.

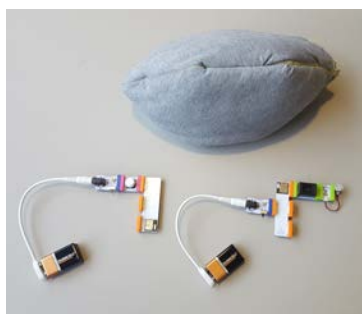Figure 7 - Gameplay Testing 2.0 and setup

Figure 8 - Game ball 'the Buzz' with LittleBits' Wireless Transmitter, Wireless Receiver, Button, Buzzer and Vibration Motor

(the Buzz) and keep it for 15 seconds without being caught by the other players. When one player achieves this three times, the player wins. The ball makes a constant beep, and when a player is caught, it buzzes, which tells the player to pass the ball. When the ball is passed, it is quiet for five seconds allowing the player with the ball to move away from the other players, who are standing still. Time and score were kept by the researchers.

Findings from Gameplay Testing 2.0 showed three main themes: Ambiguity in rules, importance of proximity and concern of safety. The research team gave instructions as above on how the gameplay was to be carried out. Noticeable, the instructions did not include how the players should handle, catch, or handover the ball, which allowed players to create their own strategies on how to play. This ensured that players had freedom to (somewhat) adjust the game to how they wanted to play. As the players had to 'steal' the ball from each other, the gameplay involved a lot of proximity. This resulted in both laughing as players bumped into one another, and a diverse use of other senses than sight, as they had to rely on their hearing and proprioception (which is the posture and the movement of parts of the body [4]). Lastly, safety was key to the players. They had to be sure that running around blindfolded, would not injure them. Therefore, safe surroundings, meaning nothing to fall over or run into, was crucial for the players to be comfortable playing the game.

Discussion
This paper presents different iterations of a sense deprivation game and shows opportunities of levelling out players' skills in a competitive game by depriving

them of one sense. We found that levelling out all players' skills by removing the same sense was key, as it prohibited one player to have advantages over the others.

Though proximity proved to be an important part of sensory deprivation games, we had concerns whether the participants would overstep each other's personal boundaries as it would be mixed gender groups, and the risk of touching inappropriately was high due to the blindfolding. To our surprise it did not concern the participants. In Gameplay Testing 2.0, which only involved women, the personal boundaries were mentioned, and one participant commented that it was nice that the test group only consisted of 'girls'. The issue had not been raised earlier in the mixed gender test groups. This could be an implication, but further testing will be necessary to assess whether it is an issue or not.

In Gameplay Testing 1.0 & 2.0, all participants had the same disadvantage, not being able to see, to avoid players having different advantages and whenever a new player caught the ball, a head start was given. Once the ball had been caught, it would go silent for five seconds, while the player could move around, and the other players had to remain still. However, the other participants would still listen to the footsteps of the moving player with the ball, because two participants chose to wear shoes. Thereby players could rather quickly position other players. A similar strategy also appears in The Early Gameplay Testing. This implication allows for further development either by having the game played in socks and on a smooth floor or by actively using it as a game factor.
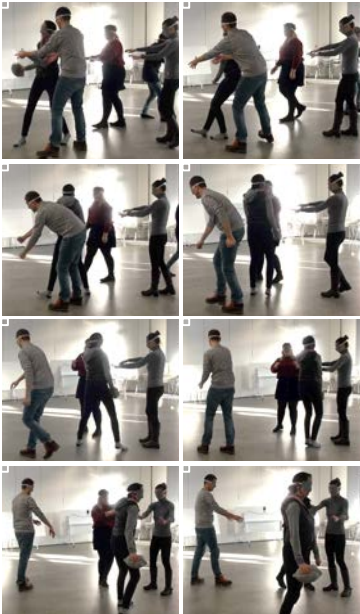
Figure 9 - P10 dodging the other players

Designing for Sight Deprivation

Taking the insights gained in the Exploration version, the Early Gameplay Testing version and Gameplay Testing 1.0 & 2.0 into consideration, three design considerations have been formulated to aid designers wanting to create sight deprivation games. The considerations are as follows.

Ambiguity: Utilizing ambiguity as a resource for designing, grants the designers the opportunity to investigate different possibilities and implications of the game without giving the answer [6]. Though Gaver proposed three type of ambiguity; ambiguity of *information*, ambiguity of *context* and ambiguity of *relationship* [6], we simply conveyed the use of ambiguity of information in our gameplay. Giving ambiguous information on how to play, supported the play by enabling the participant to apply the strategy they found useful, and not being dictated by strict rules of how to play. This is supported by the following statement on ambiguity from Isbister and Mueller [7] "players enjoy surfing uncertainty and trying to figure out optimal strategies in a somewhat messy system." Strategies, such as dodging, deceptions, and manipulation in different ways occurred during the games (Figure 9). This allowed participants to go beyond what was intended for the game, for instance, by allowing players to 'trick' other players. Permitting ambiguity in gameplay can enable new ways of engagement in games [5].

Involve proximity: It was clear, that whenever participants came in contact with or close proximity to other players, laughter and exclamations increased significantly. In all versions, laughter was prompted by players crashing into one another, touching one another and when someone was almost caught. As

discovered through our tests, incorporating proximity into the game, as a game factor, increased player engagement. Similar to Mueller et al. [10], we propose the conscious decision of applying proximity in sense deprivation games, as it facilitates new experiences of play.

Freedom to move: Participants are more likely to move freely, when they know the possibility of hitting or falling over things is minimal. Designers should ensure that participants are in a safe space when playing the game. This also allows participants the opportunity to move independently throughout the game.

As the design considerations are based on a tag-like game, the extent to which the considerations can be applied in a broader context, for instance in relation to other games, require further work and testing.

Conclusion

In this paper, we have presented our iterative process through which different versions of a sight deprivation game was explored. Based on this, we contribute with three design considerations for developing sense deprivation games. These are: allow ambiguity, involve proximity and give players the freedom to move. The next steps would be to use the design considerations in the creation of a new sense deprivation game to verify the validity of the suggestions. Furthermore, it would be interesting to test the latest gameplay version with different groups of players as well as test with players who are disabled, for instance, blind.

Acknowledgements

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